**CSC430/530 – Database Management Systems**

Assignment #3 **ANSWERS**– Relational Algebra

Using relational algebra operations, construct queries that satisfy provided descriptions. Provide resulting relation (table with tuples) for each query. Database schema and state are provided for your reference. To help with creating the symbols, here is a reference. Feel free to copy/paste:

|  |  |  |
| --- | --- | --- |
| SELECT: σ<selection condition>(R) | PROJECT: π<attribute list>(R) | RENAME: ρs(B1,B2,…,Bn)(R) |
| JOIN: R1 ⨝<join condition> R2 | NATURAL JOIN: R1 \*<join condition> R2 |  |
| UNION: R1 ∪ R2 | INTERSECTION: R1 ∩ R2 | DIFFERENCE: R1 − R2 |
| CARTESIAN PRODUCT: R1 × R2 | DIVISION: R1 ÷ R2 |  |

1. Retrieve last name and SSN of all male employees with salary more than 20000.

**RESULT ← πLname, Ssn(σSex='M' AND Salary > 20000(EMPLOYEE))**

|  |  |
| --- | --- |
| **Lname** | **Ssn** |
| Smith | 123456789 |
| Wong | 333445555 |
| Narayan | 666884444 |
| Jabbar | 987987987 |
| Borg | 888665555 |

1. Retrieve project numbers and project locations of all projects that belong to the Administration department.

**ADMIN\_DEPT ← σDname="Administration"(DEPARTMENT)**

**ADMIN\_PROJECTS ← (ADMIN\_DEPT ⨝Dnumber=Dnum PROJECT)**

**RESULT ← (πPnumber,Plocation(ADMIN\_PROJECTS))**

|  |  |
| --- | --- |
| **Pnumber** | **Plocation** |
| 10 | Stafford |
| 30 | Stafford |

1. Retrieve first name, last name, and date of birth of all employees who work more than 18 hours on project 1.

**WORKS\_18\_ON\_P1 ← σPno=1 AND Hours > 18(WORKS\_ON)**

**EMPLOYEES\_18\_ON\_P1 ← EMPLOYEES ⨝Ssn=Essn WORKS\_ON\_P1**

**RESULT ← π Fname, Lname, Bdate(EMPLOYEES\_18\_ON\_P1)**

|  |  |  |
| --- | --- | --- |
| **Fname** | **Lname** | **Bdate** |
| John | Smith | 1965-01-09 |
| Joyce | English | 1972-07-31 |

1. Retrieve name, date of birth, and relationship of all male dependents of employees who work for department 4.

**DEPT\_4\_EMPLOYEES ← σDno=4(EMPLOYEE)**

**DEPT\_4\_DEPENDENTS ← DEPT\_4\_EMPLOYEES ⨝Ssn=Essn DEPENDENT**

**RESULT ← πDependent\_Name, Bdate, Relationship(σSex='M'(DEPT\_4\_DEPENDENTS))**

|  |  |  |
| --- | --- | --- |
| **Dependent\_Name** | **Bdate** | **Relationship** |
| Abner | 1942-02-28 | Spouse |

1. Retrieve first name, last name, and salary of employees who manage departments with projects located in Houston.

**HOUSTON\_PROJECTS ← σPlocation="Houston"(PROJECT)**

**HOUSTON\_PROJECTS\_DEPT\_INFO ← DEPARTMENT ⨝Dnumber=Dnum HOUSTON\_PROJECTS**

**HOUSTON\_PROJECT\_MANAGERS ← HOUSTON\_PROJECTS\_DEPT\_INFO ⨝Mgr\_ssn=Ssn EMPLOYEE**

**RESULT ← πFname, Lname, Salary(HOUSTON\_PROJECT\_MANAGERS)**

|  |  |  |
| --- | --- | --- |
| **Fname** | **Lname** | **Salary** |
| Franklin | Wong | 40000 |
| James | Borg | 55000 |